

Surgeon's Age and Experience on Complications Following Abdominal Wall Reconstruction

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Disclosures

- **None**

Three Generations of Jedi Surgeons



Brain plasticity and functional losses in the aged: scientific bases for a novel intervention

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Aging and brain plasticity

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Age-related decline in
cognitive, motor and sensory
function

OR

Practice makes perfection

Pauwels L, Chalavi S, Swinnen SP. Aging and brain plasticity. Aging (Albany NY). 2018 Aug 1;10(8):1789-1790. doi: 10.18632/aging.101514. PMID: 30067225; PMCID: PMC6128435.

Mahncke, H. W., Bronstone, A., & Merzenich, M. M. (2006). Brain plasticity and functional losses in the aged: scientific bases for a novel intervention. Progress in brain research, 157, 81–109. [https://doi.org/10.1016/S0079-6123\(06\)57006-2](https://doi.org/10.1016/S0079-6123(06)57006-2)

Surgeon Age and Operative Mortality in the United States

Jennifer F. Waljee, MD, MPH, Lazar J. Greenfield, MD, Justin B. Dimick, MD, MPH,
and John D. Birkmeyer, MD

Objectives: Although recent studies suggest that physician age is inversely related to clinical performance in primary care, relationships between surgeon age and patient outcomes have not been examined systematically.

Methods: Using national Medicare files, we examined operative mortality in approximately 461,000 patients undergoing 1 of 8 procedures between 1998 and 1999. We used multiple logistic regression to assess relationships between surgeon age (≤ 40 years, 41–50 years, 51–60 years, and > 60 years) and operative mortality (in-hospital or within 30 days), adjusting for patient characteristics, surgeon procedure volume, and hospital attributes.

Results: Although older surgeons had slightly lower procedure volumes than younger surgeons for some procedures, there were few clinically important differences in patient characteristics by surgeon age. Compared with surgeons aged 41 to 50 years, surgeons over 60 years had higher mortality rates with pancreatectomy (adjusted odds ratio [OR], 1.67; 95% confidence interval [CI], 1.12–2.49), coronary artery bypass grafting (OR, 1.17; 95% CI, 1.05–1.29), and carotid endarterectomy (OR, 1.21; 95% CI, 1.04–1.40). The effect of surgeon age was largely restricted to those surgeons with low procedure volumes and was unrelated to mortality for esophagectomy, cystectomy, lung resection, aortic valve replacement, or aortic aneurysm repair. Less experienced surgeons (≤ 40 years of age) had comparable mortality rates to surgeons aged 41 to 50 years for all procedures.

Conclusions: For some complex procedures, surgeons older than 60 years, particularly those with low procedure volumes, have higher operative mortality rates than their younger counterparts. For most procedures, however, surgeon age is not an important predictor of operative risk.

counterparts, older physicians have poorer performance on recertification examinations and are less likely to have a current knowledge base.^{4,5} Such data have prompted calls for professional organizations to initiate more rigorous processes for performance assessment and credentialing throughout a physician's career.⁶

Whether physician age is related to clinical performance in surgery is not well established. Compared with primary care, the practice of surgery may present different challenges for the older physician. Complex procedures are long and require considerable physical and mental stamina. Previous research demonstrates that manual dexterity, strength, and visuospatial ability decrease with age, along with cognitive skills and abilities to sustain attention.^{7–11} Nonetheless, it has not been established whether such factors imply worse outcomes for patients. Two studies have suggested increased mortality rates for older surgeons with coronary artery bypass grafting and carotid endarterectomy, while others have pointed to surgeon youth and inexperience as more important risk factors.^{12–14}

To examine the potential impact of surgeon age on patient outcomes more systematically, we performed a national study of Medicare patients undergoing a wide range of complex cardiovascular and cancer procedures. We hypothesized higher mortality rates at the extremes of surgeon age, as a result of either inexperience (for younger surgeons) or diminished physical and mental skills (for older surgeons). In examining relationships between surgeon age and mortality, we adjusted for potentially confounding variables, including patient characteristics, surgeon procedure volumes, and the attributes of hospitals in which surgeons work.

- One of the first original studies to report the link between surgeons' age and complications
- Surgeons aged 41-50 years vs Surgeons > 60 years
- Complications following
 - Pancreatectomy
 - CABG
 - Carotid Artery Endarterectomy
 - Esophagectomy
 - Cystectomy
 - Aneurysm repair



OPEN Association between surgeon age and postoperative complications/ mortality: a systematic review and meta-analysis of cohort studies

Yeongin Jung^{1,7}, Kihun Kim^{2,7}, Sang Tae Choi³, Jin Mo Kang³, Noo Ree Cho⁴, Dai Sik Ko³ & Yun Hak Kim^{5,6}

The surgical workforce, like the rest of the population, is ageing. This has raised concerns about the association between the age of the surgeon and their surgical outcomes. We performed a systematic review and meta-analysis of cohort studies on postoperative mortality and major morbidity according to the surgeons' age. The search was performed on February 2021 using the Embase, Medline and CENTRAL databases. Postoperative mortality and major morbidity were evaluated as clinical outcomes. We categorized the surgeons' age into young-, middle-, and old-aged surgeons. We compared the differences in clinical outcomes for younger and older surgeons compared to middle-aged surgeons. Subgroup analyses were performed for major and minor surgery. Ten retrospective cohort studies on 29 various surgeries with 1,666,108 patients were considered. The mortality in patients undergoing surgery by old-aged surgeons was 1.14 (1.02–1.28, $p = 0.02$) ($I^2 = 80\%$) compared to those by middle-aged surgeon. No significant differences were observed according to the surgeon's age in the major morbidity and subgroup analyses. This meta-analysis indicated that surgeries performed by old-aged surgeons had a higher risk of postoperative mortality than those by middle-aged surgeons. Thus, it necessitates the introduction of a multidisciplinary approach to evaluate the performance of senior surgeons.

• **Newer study:**

Middle-aged vs Older surgeons

Middle-aged vs Younger surgeons

• **1,666,108 patients**

• **29 surgical procedures**

The Aging Surgeon: Evidence and Experience

Derek B. Asserson, MD^o; and Jeffrey E. Janis, MD^o

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Abstract

Background: With doctors in short supply and a strong demand for surgeon services in all areas of the United States, urban and rural, there are pressures to remain in active practice for longer. Even with an older workforce, there are currently no requirements for when a surgeon must retire in the United States.

Objectives: The aim of this article was to highlight the importance of the aging surgeon to the medical community and to provide an evidence-based overview of age-related cognitive and physical issues that develop during the later stages of a surgeon's career.

Methods: A search of the PubMed/MEDLINE database was performed for the phrase "aging surgeon." Inclusion criteria were applied to include only those articles related to surgeon age or retirement. Additional reports were handpicked from citations to substantiate claims with statistical evidence.

Results: The aging surgeon contributes extensive experience to patient care, but is also prone to age-related changes in cognition, vision, movement, and stress as it relates to new techniques, surgical performance, and safety measures. Studies show that although surgeons are capable of operating well into their senior years, there is the potential of decline. Nevertheless, there are proven recommendations on how to prepare an older surgeon for retirement.

Conclusions: Age-related trends in cognitive and physical decline must be counterbalanced with wisdom gained through decades of surgical experience.

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- Should there be standard retirement guidelines for surgeons?
- American Medical Association on aging surgeon
- American College of Surgeons guidelines on aging surgeon

Asserson, D. B., & Janis, J. E. (2022). The Aging Surgeon: Evidence and Experience. *Aesthetic surgery journal*, 42(1), 121–127. <https://doi.org/10.1093/asj/sjab145>

Proficiency of Surgeons in Inguinal Hernia Repair Effect of Experience and Age

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Domenic Reda, PhD,‡ Olga Jonasson, MD,|| and the CSP #456 Investigators

Objectives: We examined the influence of surgeon age and other factors on proficiency in laparoscopic or open hernia repair.

Summary Background Data: In a multicenter, randomized trial comparing open and laparoscopic herniorrhaphies, conducted in Veterans Administration hospitals (CSP 456), we reported significant differences in recurrence rates (RR) for the laparoscopic procedure as a result of surgeons' experience. We have also reported significant differences in RR for the open procedure related to resident postgraduate year (PGY) level.

Methods: We analyzed data from unilateral laparoscopic and open herniorrhaphies from CSP 456 (n = 1629). Surgeon's experience (experienced ≥ 250 procedures; inexperienced < 250), surgeon's age, median PGY level of the participating resident, operation time, and hospital observed-to-expected (O/E) ratios for mortality were potential independent predictors of RR.

Results: Age was dichotomized into older (≥ 45 years) and younger (< 45 years). Surgeon's inexperience and older age were significant predictors of recurrence in laparoscopic herniorrhaphy. The odds of recurrence for an inexperienced surgeon aged 45 years or older was 1.72 times that of a younger inexperienced surgeon. For open repairs, although surgeon's age and operation time appeared to be related to recurrence, only median PGY level of < 3 was a significant independent predictor.

Conclusion: This analysis demonstrates that surgeon's age of 45 years and older, when combined with inexperience in laparoscopic inguinal herniorrhaphies, increases risk of recurrence. For open repairs, only a median PGY level of < 3 was a significant risk factor.

(*Ann Surg* 2005;242: 344–352)

We have published results of a large multicenter, randomized clinical trial comparing open mesh and laparoscopic mesh herniorrhaphies, including a finding that surgeon's experience, as measured by number of laparoscopic herniorrhaphy procedures previously performed, was a significant predictor of recurrence in the laparoscopic group.^{1,2} Briefly, 2164 men were randomized to open mesh (Lichtenstein) or laparoscopic mesh repair. Of these, 1984 underwent repair and 1696 were available for assessment of recurrence at 2 years. We found a significantly higher recurrence rate in the laparoscopic group (10%) than the open group (5%). Surgeons reporting experience with more than 250 laparoscopic herniorrhaphies before the beginning of the study, however, had recurrence rates with laparoscopic repair equivalent to that with open repair (5%). We also found a higher complication rate with the laparoscopic technique.¹ In a further analysis, we examined the influence of the participating resident's training experience on recurrence rates in both laparoscopic and open repairs. We found that a postgraduate year (PGY) level < 4 was a strong independent predictor of recurrence in the open but not the laparoscopic group.²

Whether the association between recurrence and experience results from the degree of specific experience with the procedure alone or from other factors contribute to this finding is unknown. In this report, we examine the effect of surgeon's age, volume of experience in laparoscopic or open tension-free hernia repair, operation time, and institutional



Learning Curves for Robotic-Assisted Ventral Hernia Repair

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Abstract

IMPORTANCE Although the use of robotic-assisted ventral hernia repairs has increased significantly over the last decade, the experience surgeons need to achieve comparable outcomes with more established laparoscopic and open approaches has not been well characterized.

OBJECTIVE To estimate the learning curves for robotic-assisted ventral (incisional and umbilical) hernia repair.

DESIGN, SETTING, AND PARTICIPANTS This retrospective cohort study included Medicare fee-for-service patients (≥ 18 years) enrolled in Medicare Part A and Part B with no managed care undergoing ventral hernia repairs between 2010 and 2020. Multivariate logistic regression was used to estimate reoperation rates for hernia recurrence, adjusting for patient demographics, comorbidities, mesh placement, and hospital characteristics. Analyses were conducted from October 2023 to July 2024.

EXPOSURE Incremental robotic-assisted hernia repair volume.

MAIN OUTCOME AND MEASURE Reoperation for hernia recurrence within 7 years of index hernia repair.

RESULTS This study comprised 160 379 Medicare patients (mean [SD] age, 69 [11] years), of whom 93 272 (58.2%) were female, 13 799 (8.6%) were Black, 3124 (2.0%) were Hispanic, and 138 311 (86.2%) were White. Among these patients, 12 609 (7.9%) underwent robotic-assisted hernia repairs, 32 337 (20.2%) laparoscopic repairs, and 115 433 (71.9%) open repairs. This study also included 23 580 surgeons, with 5074 performing robotic-assisted hernia repairs. The national reoperation rates for hernia recurrence after laparoscopic and open repairs were 12.5% (95% CI, 12.06%-12.94%) and 12.9% (95% CI, 12.70%-13.15%), respectively. Reoperation rates decreased as

Key Points

Question How many surgical cases are associated with achieving comparable long-term outcomes after robotic-assisted ventral hernia repair compared with laparoscopic and open approaches?

Findings In this cohort study of 23 580 surgeons, approximately 19 robotic-assisted hernia repairs were associated with comparable long-term reoperation rates for hernia recurrence as laparoscopic and open repairs; however, fewer than 6% of surgeons exceeded that volume.

Meaning These results suggest that while increasing experience with robotic-assisted hernia repairs is associated with improved long-term outcomes, most surgeons do not perform enough cases to reach equivalent reoperation rates for hernia recurrence to more established laparoscopic and open approaches.

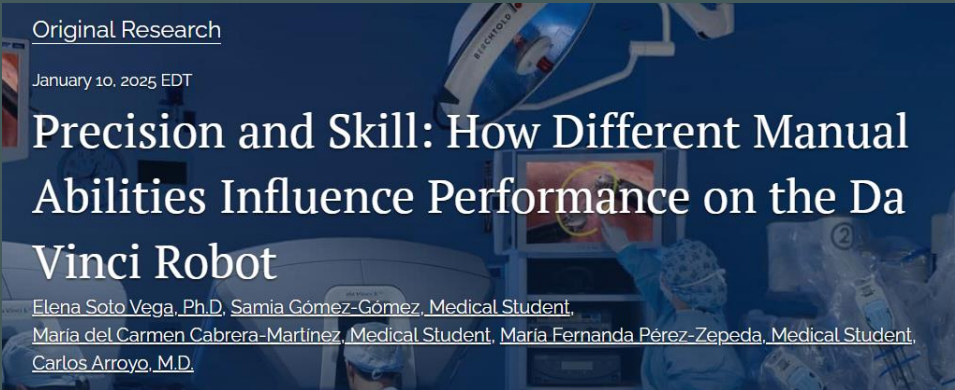
- But experience comes with aging, does it matter?

- How is experience defined?

- Experience and Aging in the context of hernia repair

Neumayer LA, Gawande AA, Wang J, Giobbie-Hurder A, Itani KM, Fitzgibbons RJ Jr, Reda D, Jonasson O; CSP #456 Investigators. Proficiency of surgeons in inguinal hernia repair: effect of experience and age. *Ann Surg*. 2005 Sep;242(3):344-8; discussion 348-52. doi: 10.1097/01.sla.0000179644.02187.ea. PMID: 16135920; PMCID: PMC1357742.

Loh WS, Howard RA, Fry BT, Thumma JR, Norton EC, Dimick JB, Sheetz KH. Learning Curves for Robotic-Assisted Ventral Hernia Repair. *JAMA Netw Open*. 2024 Dec 2;7(12):e2448521. doi: 10.1001/jamanetworkopen.2024.48521. PMID: 39625721; PMCID: PMC11615711.



Original Research

January 10, 2025 EDT

Precision and Skill: How Different Manual Abilities Influence Performance on the Da Vinci Robot

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Ventral Hernia Repairs

Robotic

Laparoscopic

Open

SCIENTIFIC PAPER

Robotic Surgical Skills: Acquisition, Maintenance, and Degradation

Eric L. Jenison, MD, Karen M. Gil, PhD, Thomas S. Lendvay, MD, Michael S. Guy, MD

ABSTRACT

Background and Objectives: The degradation in robotic skills that occurs during periods of robotic surgical inactivity in newly trained surgeons was measured. The role of animate training in robotic skill was also assessed.

Methods: Robotically naïve resident and attending surgeons underwent training with the da Vinci® robot on needle passage (DN), rocking ring transfer peg board (RPB), and running suture pod tasks (SP). Errors were established to convert actual time to adjusted time. Participants were deemed “proficient” once their adjusted times were within 80% of those set by experienced surgeons through repeated trials. Participants did not use the robot except for repeating the tasks once at 4, 8, and 12 weeks (tests). Participants then underwent animate training and completed a final test within 7 days.

Results: Twenty-five attending and 29 resident surgeons enrolled; 3 withdrew. There were significant increases in time to complete each of the tasks, and in errors, by 4 weeks (Adjusted times: DN: 122.9 ± 2.2 to 204.2 ± 11.7, t=6.9, P<.001; RPB: 262.4 ± 2.5 to 364.7 ± 8.0, t=12.4, P<.001; SP: 91.4 ± 1.4 to 169.9 ± 6.8, t=11.3, P<.001). Times decreased following animate training, but not to

levels observed after proficiency training for the RPB and SP modules.

Conclusions: Robotic surgical skills degrade significantly within 4 weeks of inactivity in newly trained surgeons. Animate training may provide different skills than those acquired in the dry lab.

Key Words: Robotic surgical skills, Training, Degradation.

INTRODUCTION

Since its introduction in 2001, the number of surgeons across multiple specialties adopting the *da Vinci* Surgical System has grown rapidly and yet little is understood about methodologies to develop surgeons who are skilled with this new technology. In the United States at the end of 2010, there were 1285 systems installed, and a total of 1752 installed worldwide.¹ That year, approximately 278 000 procedures were performed robotically; a 35% increase from 2009. Of these cases, the most commonly performed was the robotic total laparoscopic hysterectomy (110 000 cases, of which 32 000 were for malig-

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Original article

Training in robotic surgery: initial experience using the Brazilian College of Surgeons model

Treinamento em cirurgia robótica: experiência inicial pelo modelo do Colégio Brasileiro de Cirurgiões

FERNANDO DE BARROS, TCBC-RJ^{1,2}; VERONICA BERNARDINO FELICIO²; ANA CAROLINE LIMA TABEL²; ANA CAROLINA CAPUANO CERBONE².

ABSTRACT

Objective: to present the initial experience of the first tier of surgeons trained in the new model of robotic surgery training proposed by the CBC. **Methods:** we retrospectively collected data and information on training with the Da Vinci S1 robotic system. The variables analyzed were, in the pre-clinical phase, time of completion of each step by surgeon and number of hours in the simulator, and in the clinical phase, operations carried out by the training group, number of surgeons who performed nine procedures in ninety days (“9 in 90”), time of docking, time of console, and results surgical. **Results:** we interviewed 39 surgeons before training started; 20 (51.3%) reached the clinical phase. The average age of surgeons was 47.9 years (38-62). The average time between the first interview and the delivery of the online certificate was 64 days (15-133). The surgeons have made an average of 51h and 36 minutes of robot simulation (40-83 hours). The total number of cases in which the training surgeons participated as first assistant was 418, with an average of 20.9 per surgeon. The time of pre-clinical training had an average of 116 days (48-205). **Conclusion:** the new model proposed had good acceptance by all surgeons trained and proved safe in the initial sample.

Keywords: Robotic Telesurgery, Training, Robotic Surgical Procedure.

INTRODUCTION

In 2020, in an unprecedented action, the

Barros F, Felicio VB, Tabet ACL, Cerbone ACC. Training in robotic surgery: initial experience using the Brazilian College of Surgeons model. Rev Col Bras Cir. 2021 Jun 14;48:e20202969. doi: 10.1590/0100-6991e-20202969. PMID: 34133655; PMCID: PMC10683448.

Jenison EL, Gil KM, Lendvay TS, Guy MS. Robotic surgical skills: acquisition, maintenance, and degradation. JLS. 2012 Apr-Jun;16(2):218-28. doi: 10.4293/108680812x13427982376185. PMID: 23477169; PMCID: PMC3481234.

METHODS

Survey Questions:

1. Which best describes your gender? a. Male b. Female c. Prefer not to say
2. Which of the following best describe your practice setting? a) Academic b) Solo Private Practice c) Group Private Practice d) Hospital-employed e) Other (please describe)
3. What is your current specialty: a). Plastic surgery b) General surgery c) Other (please describe)
4. If you selected Plastic Surgery in Question 3 or maintain board certification in both plastic surgery and general surgery, when was your initial plastic surgery board certification? (Enter Year)
5. If you selected General Surgery in Question 3, when was your initial board certification? (Enter Year)
6. What is your age? (*Survey design should be drop down choices 25-99*)
7. What year did you finish your residency training? (Enter Year)
8. Approximately how many complex abdominal wall reconstructions (CAWR) do you perform in a year? (*Survey design should include a textbox to input a number*)

- **We conducted a retrospective review of Abdominal Core Health Quality Collaborative Database.**
- **Inclusion criteria**
- **Exclusion criteria**
- **To collect surgeons' data, we conducted a separate survey to match each patient in the database to their surgeon.**
- **Variables collected: Patients' demographics, hernia characteristics, operative details, and outcomes**
- **Primary outcome was hernia recurrence. Secondary outcomes were surgical site occurrences and reoperation rates**

- **Approach-specific experience was defined as the ratio of the number of cases reported by each surgeon for a particular approach to their total estimated lifetime cases.**
- **Surgeons were dichotomized as “experienced” and “inexperienced” using their 50th percentile cutoff.**
- **Surgeons were categorized into <46 years old, 46-51 years old and >51 years old age groups using their 25th and 50th percentiles cutoffs.**
- **Covariates were VHWG, hernia dimension, case volumes (defined as annual cases of VHRs performed based on survey), BMI >30kg/m² and OR time >2hours**

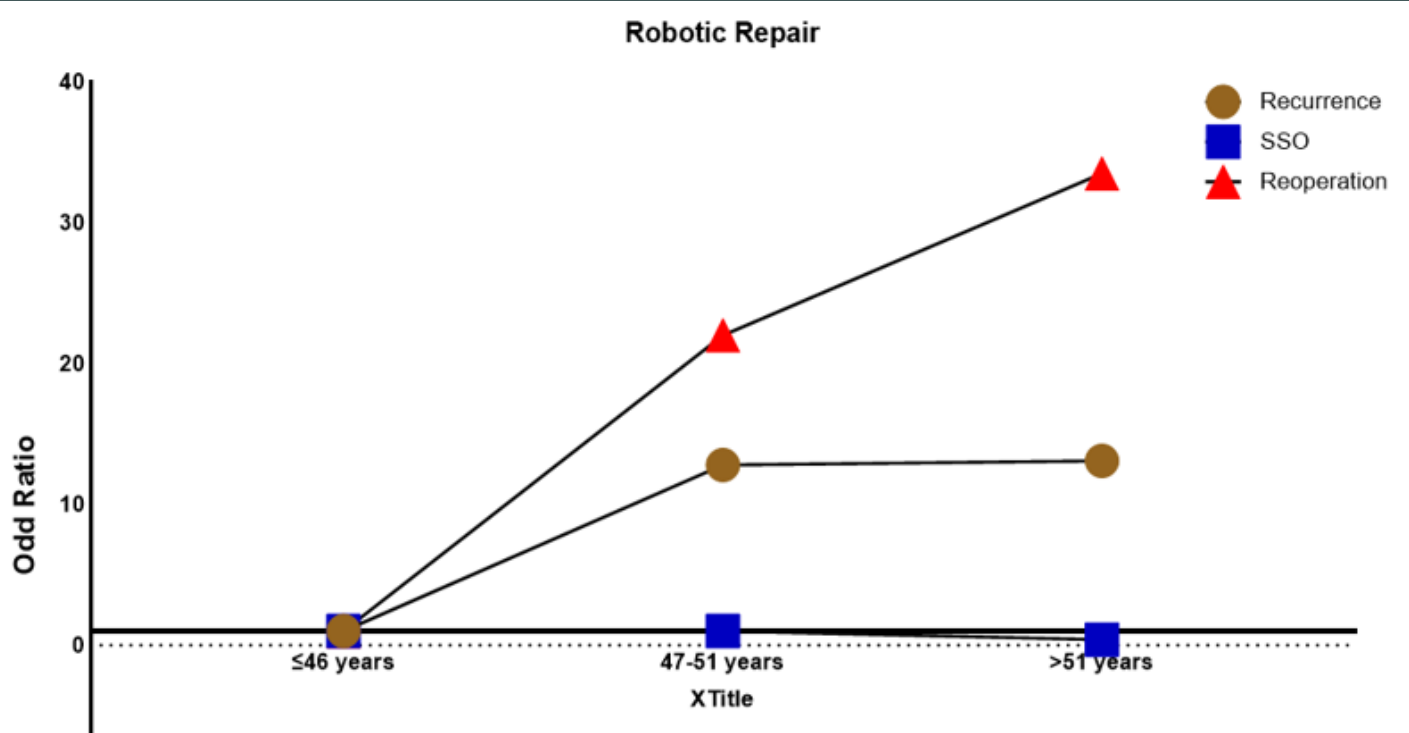
RESULTS

Patient Demographics	Open	Robotic	Laparoscopic
	n=10,431	n=4257	n=1626
Male:Female	5459:4972	2301:1956	805:821
Mean Age	58.2 years	57.6 years	56.8 years
Diabetes	8333 (79.9%)	644 (15.1%)	305 (18.8%)
Hypertension	5356 (51.3%)	2112 (49.6%)	804 (49.4%)
Mean Defect size	188.0cm ²	41.5cm ²	34.2cm ²
Mean BMI	32.2kg/m ²	31.9kg/m ²	33.4kg/m ²
Obesity	6,276 (60.2%)	2,432 (57.1%)	1056 (64.9%)
VHWG			
1	2300 (22.0%)	1,382 (32.5%)	412 (25.3%)
2	5083 (48.7%)	2622 (61.6%)	1112 (68.4%)
3	2851 (27.3%)	249 (5.9%)	101 (6.2%)
4	197 (2.0%)	4 (0.09%)	1 (0.06%)
Recurrence	433 (4.1%)	77 (1.8%)	52 (3.2%)
≤46 years	87 (0.8%)	21 (0.5%)	13 (0.8%)
46-51 years	63 (0.6%)	13 (0.3%)	10 (0.6%)
>51 years	283 (2.7%)	43 (1.0%)	29 (1.8%)

SSO	1457 (14.0%)	297 (7.0%)	170 (10.5%)
≤46 years	470 (4.5%)	123 (2.9%)	57 (3.5%)
46-51 years	154 (1.5%)	60 (1.4%)	21 (1.3%)
>51 years	833 (8.0%)	114 (2.7%)	92 (5.7%)
Reoperation	590 (5.6%)	103 (2.4%)	62 (3.8%)
≤46 years	159 (1.5%)	17 (0.4%)	15 (0.9%)
46-51 years	85 (0.8%)	22 (0.5%)	16 (1.0%)
>51 years	346 (3.3%)	64 (1.5%)	31 (1.9%)

- Patients Demographics
- Baseline Characteristics
- Outcome Distribution

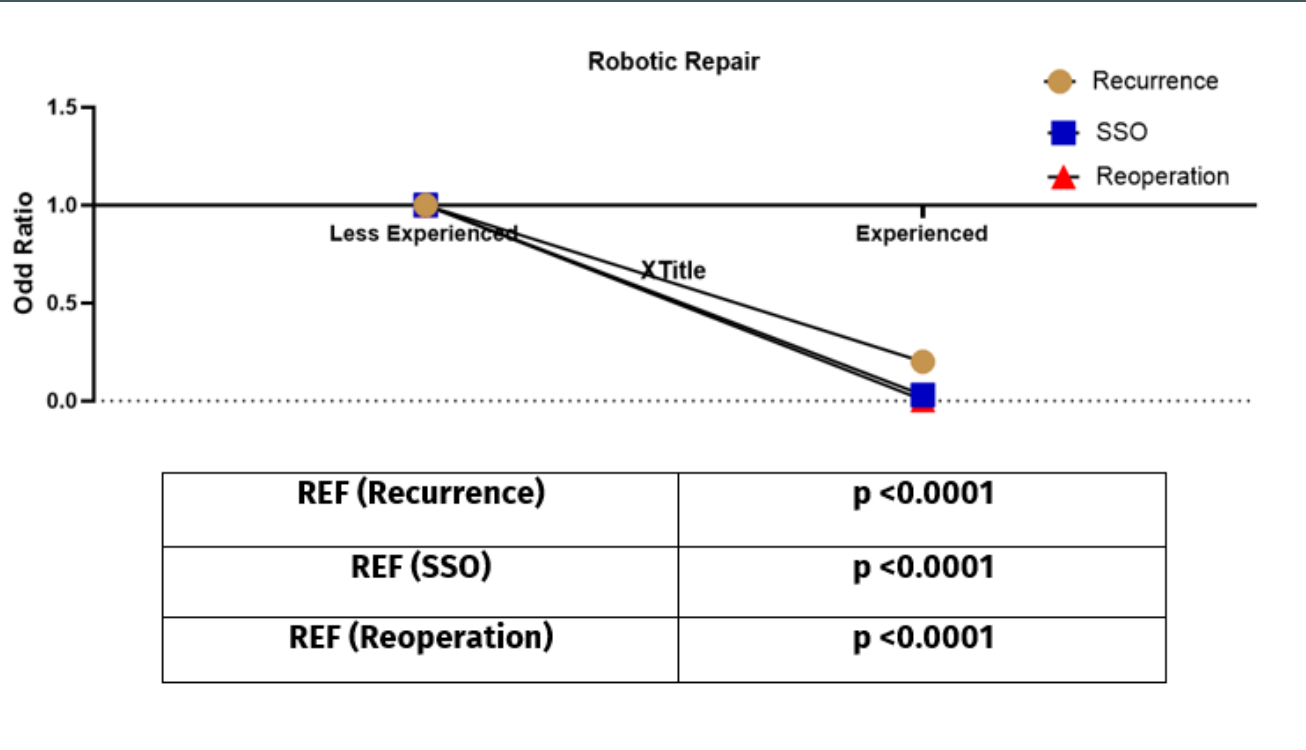
Robotic – Effect of Age



REF (Recurrence)	p <0.0001	p <0.0001
REF (SSO)	P=0.99	p <0.0001
REF (Reoperation)	p <0.0001	p <0.0001

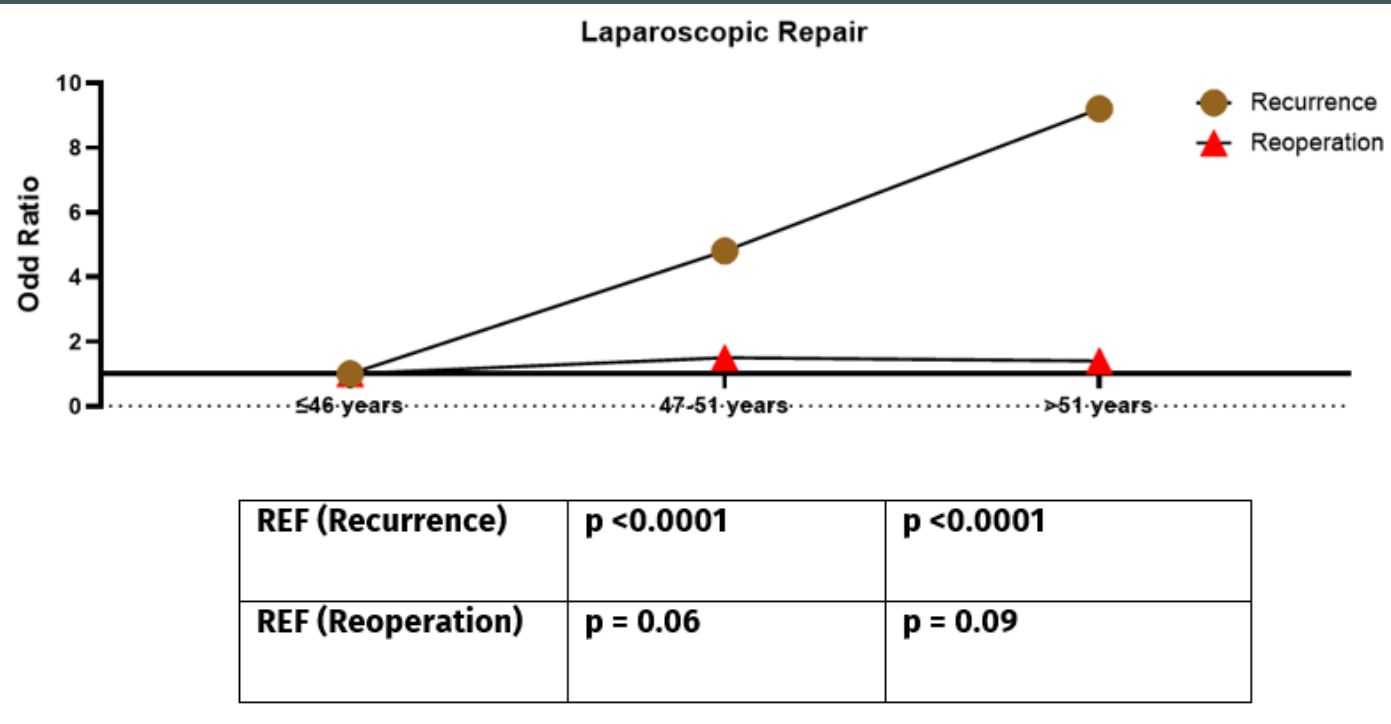
- Surgeons aged 47-51 years, and those >51 years had higher odds of recurrence and reoperation.
- No difference in the odds of SSO between surgeons aged 47-51.
- Surgeons older than 51 years have lower odds of SSO.

Robotic – Effect of Experience



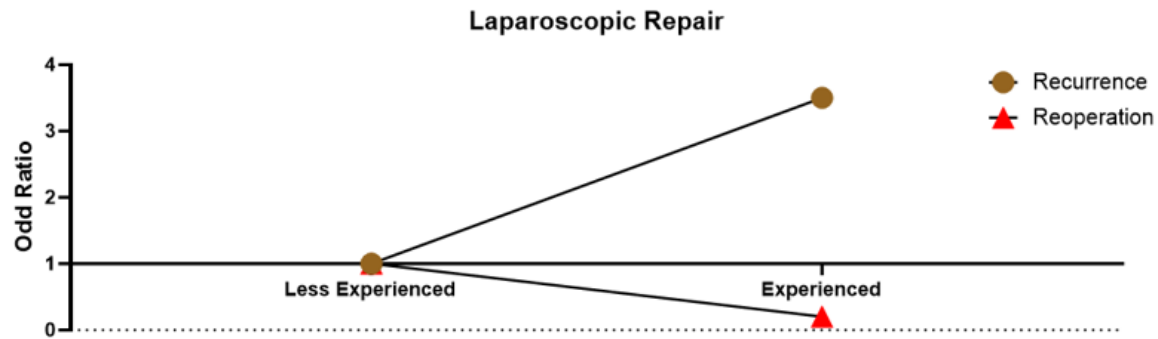
- Experienced surgeons have lower odds of recurrence, reoperation and SSO

Laparoscopic Repair – Effect of Age



- Surgeons aged 47-51 years, and those >51 years had higher odds of recurrence
- No difference in the odds of reoperation between surgeons aged 47-51, and >51 years compared those ≤ 46 years old.

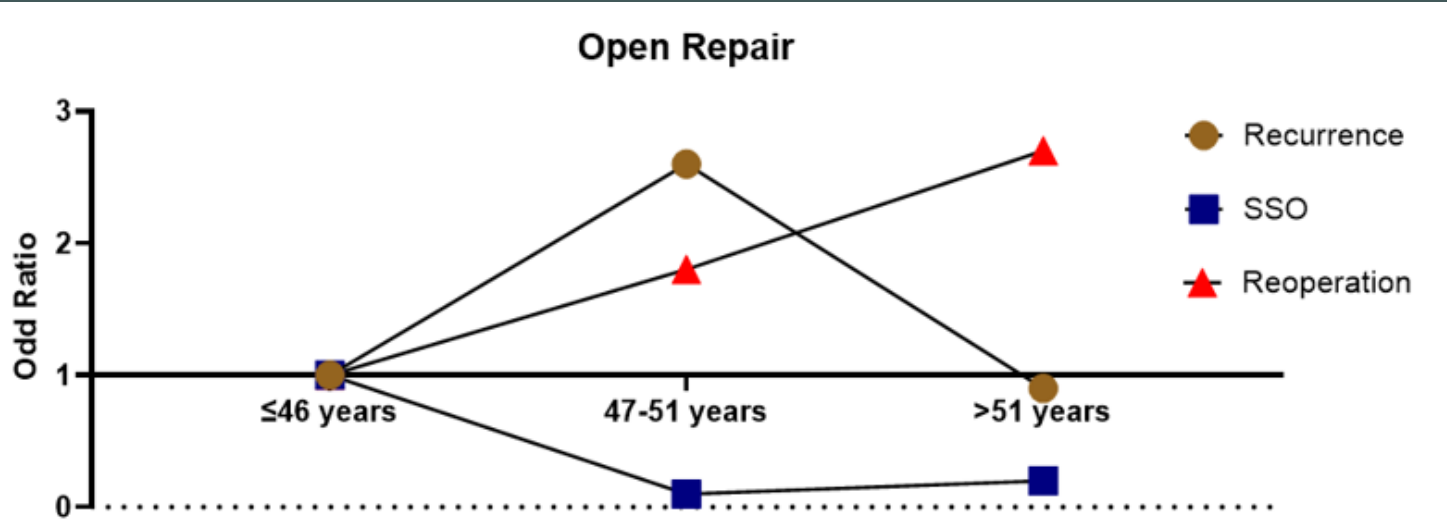
Laparoscopic Repair – Effect of Experience



REF (Recurrence)	p <0.0001
REF (Reoperation)	p <0.0001

- Experienced surgeons have higher odds of recurrence
- Experienced surgeons have lower odds of reoperation

Open Repair – Effect of Age

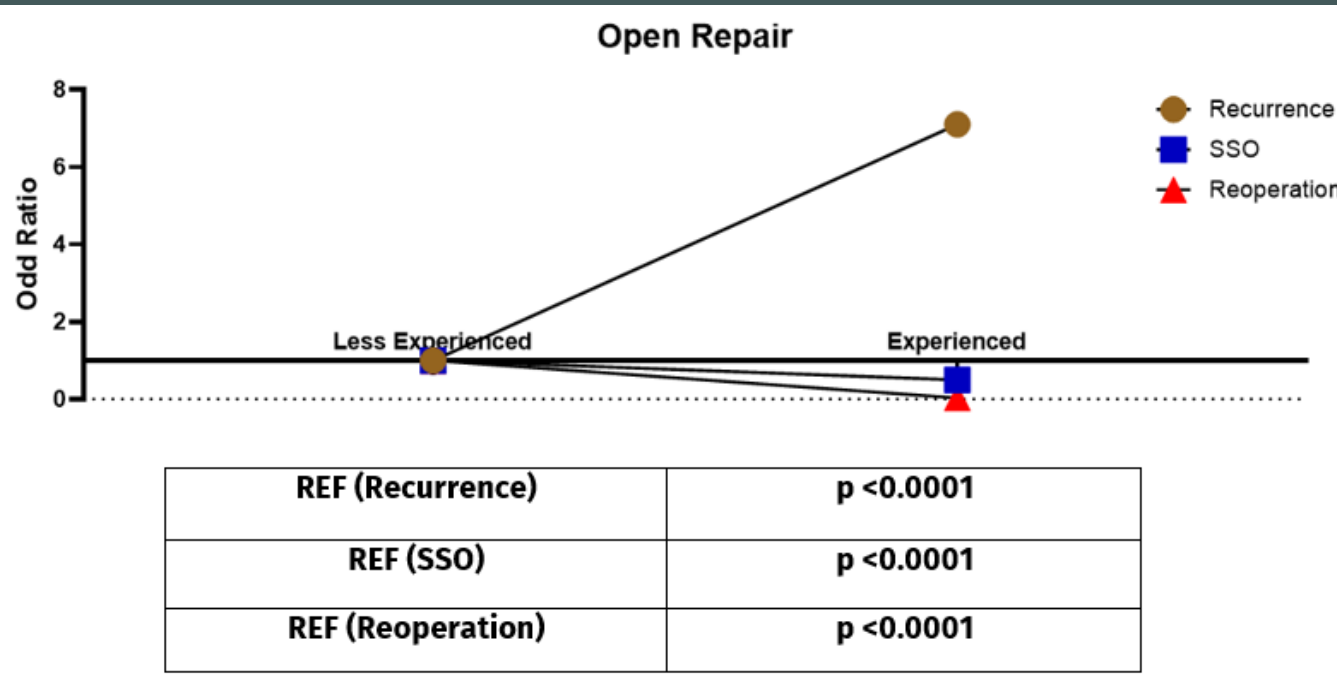


REF (Recurrence)	p <0.0001	p = 0.02
REF (SSO)	p <0.0001	p <0.0001
REF (Reoperation)	p <0.0001	p <0.0001

- Surgeons aged 47-51 years have **higher** odds of recurrence
- Surgeons aged >51 years have **lower** odds of recurrence.
- Surgeons aged 47-51 years and >51 years have **lower** odds of **SSO**
- Surgeons aged 47-51 and >51 years have **higher** odds of **reoperations**

Open Repairs – Effect of Experience

- Experienced surgeons have higher odds of recurrence
- Experienced surgeons have lower odds of SSO and reoperation



TAKEAWAYS

- **Age and Experience influence complications following VHR.**
- **Experience and Age are both independent factors**
- **Experienced surgeons have lower odds of post-VHR complications.**
- **Adequate experience may mask age related declines.**
- **Age and experience directly impact SSO and reoperation. Recurrence on the otherhand is multifactorial.**

Thanks for Listening.

**Special Appreciation to my mentor, Dr Jeffrey E. Janis,
our entire team, and the QC team for their support
throughout this project**

